

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization International Bureau



(43) International Publication Date  
23 June 2005 (23.06.2005)

PCT

(10) International Publication Number  
**WO 2005/057060 A3**

(51) International Patent Classification<sup>7</sup>: **F01L 9/04**

(21) International Application Number:  
**PCT/JP2004/018684**

(22) International Filing Date: 8 December 2004 (08.12.2004)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:  
2003-415686 12 December 2003 (12.12.2003) JP

(71) Applicant (for all designated States except US): **TOYOTA JIDOSHA KABUSHIKI KAISHA [JP/JP]**; 1, Toyota-cho, Toyota-shi, Aichi, 4718571 (JP).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **KUSAKA, Yasushi [JP/JP]**; c/o Toyota Jidosha Kabushiki Kaisha, 1, Toyota-cho, Toyota-shi, Aichi 4718571 (JP). **ASADA,**

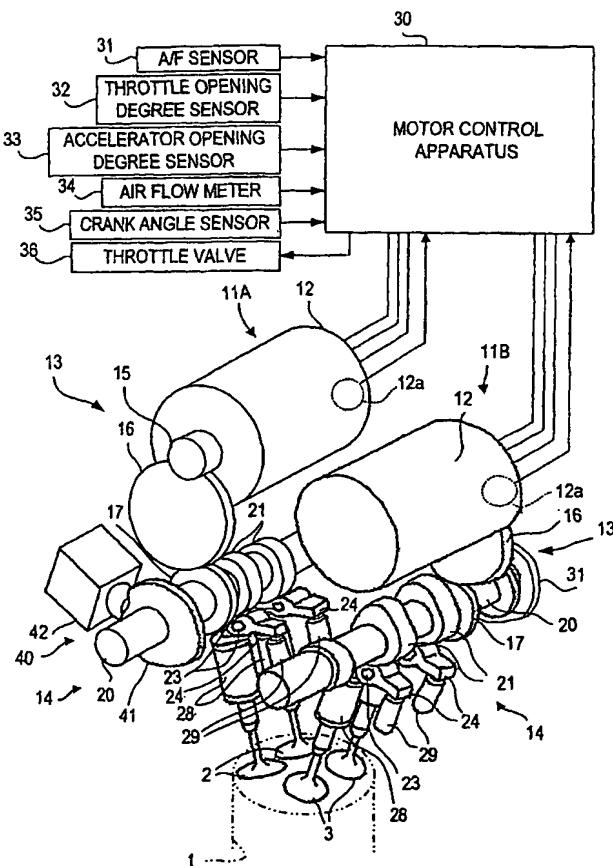
**Toshiaki [JP/JP]**; c/o Toyota Jidosha Kabushiki Kaisha, 1, Toyota-cho, Toyota-shi, Aichi 4718571 (JP). **EZAKI, Shuichi [JP/JP]**; c/o Toyota Jidosha Kabushiki Kaisha, 1, Toyota-cho, Toyota-shi, Aichi 4718571 (JP). **TSUJI, Kimitoshi [JP/JP]**; c/o Toyota Jidosha Kabushiki Kaisha, 1, Toyota-cho, Toyota-shi, Aichi 4718571 (JP).

(74) Agents: **YAMAMOTO, Koji et al.**; c/o Tokyo Central Patent Firm, 4th Floor, Oak Building Kyobashi, 16-10, Kyobashi 1-chome, Chuo-ku, Tokyo, 1040031 (JP).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

*[Continued on next page]*

(54) Title: VALVE GEAR



(57) Abstract: There is provided a valve gear (11A, 11B) of an internal combustion engine converting a rotational motion of a motor (12) into a linear motion by a cam (21), and driving an intake valve (2) or an exhaust valve (3) of a cylinder (1) so as to be opened and closed based on the linear motion, a motor control apparatus (30) which can actuate the motor (12) in a rocking drive mode in which a rotating direction of the cam (21) is changed during a lift of the valve (2, 3). The motor control apparatus (30) controls a motion of the motor (12) such that the cam (21) starts rotating before the valve (2, 3) starts lifting in the rocking drive mode.



(84) Designated States (*unless otherwise indicated, for every kind of regional protection available*): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

— before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments

(88) Date of publication of the international search report:  
11 August 2005

*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

Published:

— with international search report